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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/649,006

08/26/2003

Sai-Mun Lee

70011377-2

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10/22/2004

AGILENT TECHNOLOGIES, INC.

Legal Department, DL429

Intellectual Property Administration

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EXAMINER

MAGEE, THOMAS J

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 10/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/649,006

Applicant(s)

LEE ET AL.

Examiner

Thomas J. Magee

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>07022004</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections – 35 U.S.C. 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 – 4, and 9 – 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Nicewarner (5,327,325).

3. Regarding Claim 1, Nicewarner discloses a packaging structure for a semiconductor device comprising:

a substrate (10) (Figure 3) surface mountable on a mounting surface of a circuit board, wherein the substrate has a first side facing away (up direction) from the mounting surface (down direction) and a second side (bottom) being on the same side of the structure as the mounting surface,

a recess (bottom) in the second side of the substrate,

a semiconductor die (30) having a first side and a second side, and mounted in said recess with the first side of the semiconductor die facing away from the mounting surface and a portion of the first side of the semiconductor die bonded to said substrate within the recess.

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4. Regarding Claim 2, Nicewarner discloses that said recess includes an exposed portion of the substrate facing the mounting surface and a portion of the first side of the die is bonded to said exposed portion.

5. Regarding Claim 3, Nicewarner discloses a structure wherein the bond between the die and the substrate is an electrical connection (at 77,78) (Col. 4, lines 58 – 65).

6. Regarding Claim 4, Nicewarner discloses that the substrate has a hollow portion (See Figure 3) extending from the first side of the substrate to the recess.

7. Regarding Claim 9, Nicewarner discloses that the electrical connections run from where the die is bonded to said recess to the mounting surface (Col. 4, lines 58 – 65).

8. Regarding Claim 10, Nicewarner does not explicitly disclose that bond pads connect said die to said electrical connections. However, it is implicit that there are connection pads on the die to mate with the lead connections (Figure 3).

9. Regarding Claims 11 and 12, Nicewarner discloses (Figure 3) (80) that a viscous resin sealant (Col. 5, lines 5 – 7) is used between the edges of die and the substrate.

Claim Rejections – 35 U.S.C. 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obvious-

ness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 5 – 8, and 16 – 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nicewarner, as applied to Claims 1 – 4, and 9 – 12, and further in view of Peterson et al. (US 6,674,159 B1).

12. Regarding Claim 5, Nicewarner does not disclose that the substrate comprises first and second substrate layers. Peterson et al. disclose that the substrate comprises first (16) and second (30) (Figure 3A) substrate layers, the first substrate layer having first and second opposing sides and the second substrate layer having first and second opposing sides, where the first side of the first substrate layer is the first side of the substrate and the second side of the second substrate layer is the second side of the substrate, and the second side of the first substrate layer is mounted to the first side of the second substrate layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fabrication procedures of Peterson et al. in Nicewarner to obtain an efficient low cost package.

13. Regarding Claim 6, Nicewarner does not disclose a two layer substrate having a hollow portion extending from the first side of the second layer to the second side of the second layer. Peterson et al. disclose that the second substrate layer (30) has inner walls defining a hollow portion (36) extending from the first side of the second substrate layer to the second side of the second substrate layer with the inner walls defining at least part of said recess. It

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would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fabrication procedures of Peterson et al. in Nicewarner to obtain an efficient low cost package.

14. Regarding Claim 7, Nicewarner does not disclose a two layer substrate having a hollow portion extending from the first side of the first layer to the second side of the first layer, wherein the hollow portion through the first substrate layer is smaller than that of the second hollow portion.

Peterson et al. disclose a structure wherein:

the first substrate layer (16) has a hollow portion (22) extending from the first side of the first substrate layer to the second side of the first substrate layer,

the hollow portion through the first substrate layer (22) is smaller than the hollow portion through the second substrate layer (36), such that where the second side of the first substrate layer is mounted to the first side of the second substrate layer, a portion of the second side of the first substrate layer is exposed, not being covered by the first side of the second substrate layer,

the exposed portion of the first substrate layer defines at least part of the recess.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the fabrication procedures of Peterson et al. in Nicewarner to obtain an efficient low cost package.

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15. Regarding Claim 8, Nicewarner discloses (Col. 4, lines 11 – 16) the presence of a rectangular shaped hollow portion (cavity). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the rectangular shaped hollow portion of Nicewarner in the two layer substrate package of Peterson et al. for ease in mounting of rectangular shaped integrated circuit die.

16. Regarding Claim 16, Nicewarner does not explicitly disclose that the mounted die is a sensor chip. Peterson et al. disclose that the die is a sensor chip (Col.5, lines 4 – 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Peterson et al. with Nicewarner to obtain a low cost package housing for a sensor chip.

17. Regarding Claims 17 and 18, Nicewarner does not disclose that a transparent cover is present at the first side of the substrate. Peterson et al. disclose that a non-opaque portion is mounted to the substrate on the same side as the first side of the substrate, wherein the non-opaque portion is a transparent cover (26) (Figure 3A) (Col. 9, lines 12 – 15). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine Peterson et al. with Nicewarner to obtain a package housing with a transparent cover for mounting optical components/sensors.

18. Claims 13 – 15 are rejected under 35 U.S.C 103(a) as being unpatentable over Nicewarner, as applied to Claims 1 – 4, and 9 – 12, and further in view of Bhagwagar (US 6,791,839 B2).

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19. Regarding Claims 13 – 15, Nicewarner discloses the presence of a viscous sealant (encapsulant) (80) (Figure 3) that is “flush” with the level of the second side of the substrate, but does not disclose explicitly that the encapsulant is thermally conducting and electrically insulating. Bhagwagar discloses that an additive to an epoxy (Col. 4, lines 37 – 41) produces a thermally conducting and electrically insulating (Col. 6, lines 52 – 53) encapsulant material. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the encapsulant material of Bhagwagar with Nicewarner to obtain a sealant that conducts heat away from the die, while electrically insulating the die from the substrate.

Conclusions

20. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to **Thomas Magee**, whose telephone number is **(571) 272 1658**. The Examiner can normally be reached on Monday through Friday from 8:30AM to 5:00PM (EST). If attempts to reach the Examiner by telephone are unsuccessful, the examiner’s supervisor, **Eddie Lee**, can be reached on **(571) 272-1732**. The fax number for the organization where this application or proceeding is assigned is **(703) 872-9306**.

Thomas Magee
October 8, 2004



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

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